Introduction to TCCC

Pre-Test

Objectives

- **EXPLAIN** the differences between military and civilian pre-hospital trauma care
- **DESCRIBE** the key factors influencing combat casualty care
- **SUMMARIZE** development of TCCC
- **DESCRIBE** the phases of care in TCCC

What is TCCC and Why Do I Need to Learn about it??

- Coalition forces presently have the best casualty treatment and evacuation system in history.
- TCCC is what will keep you alive long enough to benefit from it.

Comparison of Statistics for Battle Casualties, 1941-2005

Holcomb et al J Trauma 2006

The U.S. casualty survival rate in Iraq and Afghanistan has been the best in U.S. history.

	World War II	Vietnam	OIF/OEF
CFR	19.1%	15.8%	9.4%

Note: CFR is the Case Fatality Rate – the percent of those wounded who die

Why Are We Doing Better?

- Improved Personal Protective Equipment
- Tactical Combat Casualty Care
- Faster evacuation time
- Better trained medics

Holcomb et al J Trauma 2006

TCCC: The New Standard of Care for Managing Trauma on the Battlefield

- Used by Army, Navy, Air Force, Marine Corps, Coast Guard
- Used by most coalition partner nations
- Used by NATO
- Used by other countries around the world

USFOR-A FRAGO 14-067
21 March 2014

- All physicians, physician assistants, nurse practitioners, medics, corpsmen, Parajumpers (PJs) and nurses in CJOA-A (Afghanistan) will be trained in TCCC
- Training will be done in accordance with current TCCC Guidelines (found on Joint Trauma System website)
- Curriculum to support this training is found on the Military Health System website
- Training is reportable to the chain of command
- Units will field equipment to perform TCCC

Importance of the First Responder

- Almost 90% of all combat deaths occur before the casualty reaches a Medical Treatment Facility (MTF)
- The fate of the injured often lies in the hands of the one who provides the first care to the casualty.
- Corpsman, medic, or pararescueman (PJ)
- Combat Lifesaver or non-medical combatant

Trauma Care Setting

Tactical Trauma Care Setting – Shrapnel Wound in the Hindu Kush

Prehospital Trauma Care: Military vs. Civilian

- Hostile fire
- Darkness
- Environmental extremes
- Different wounding epidemiology
- Limited equipment
- Need for tactical maneuver
- Long delays to hospital care
- Different medic training and experience

Prior Medical Training

- Combat medical training historically was modeled on civilian courses:
  - Emergency Medical Technician
  - Advanced Trauma Life Support
- Trained to standard of care in non-tactical (civilian) settings
- Tactical elements not considered

Different Trauma Requires Different Care Strategies

- It is intuitive that combat and civilian trauma are different, BUT…
- It is difficult to devise and implement needed changes.
- No one group of medical professionals has all of the necessary skills and experience.
- Trauma docs and combat medical personnel have different skill sets. Both are needed to optimize battlefield trauma care strategies.
- Tourniquets are one striking example of how battlefield trauma care has sometimes been slow to change.

Tourniquets in WWII
Wolff AMEDD J April 1945

"We believe that the strap-and-buckle tourniquet in common use is ineffective in most instances under field conditions… it rarely controls bleeding no matter how tightly applied."

Vietnam

- Over 2500 deaths occurred in Vietnam secondary to hemorrhage from extremity wounds
- These casualties had **no other injuries**

SOF Deaths in the GWOT
Holcomb, et al
Annals of Surgery 2007

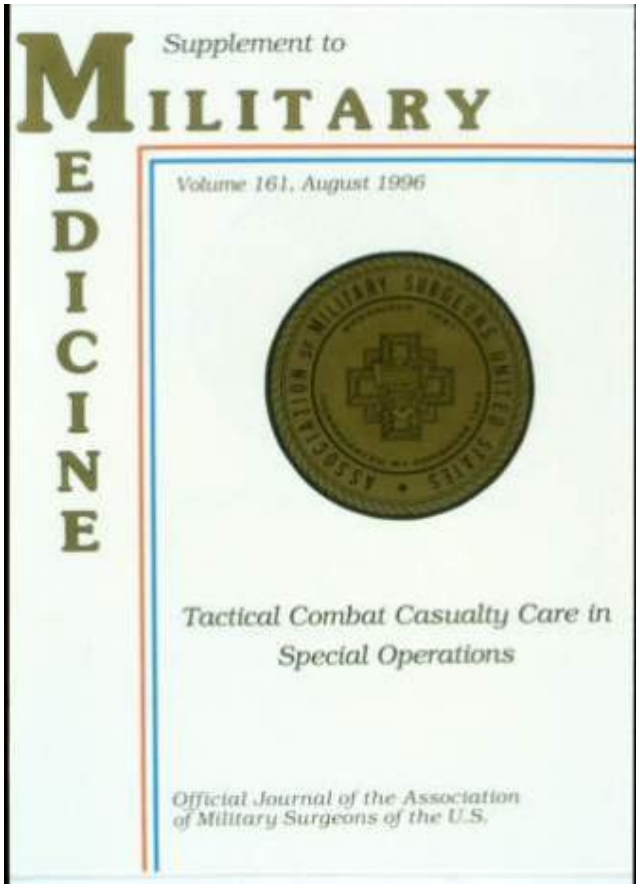
Factors That Might Have Changed Outcomes
(82 Fatalities – 12 Potentially Survivable):

- Hemostatic dressings/direct pressure (2)
- Tourniquets (3)
- Faster CASEVAC or IV hemostatic agents (7)
- Surgical airway vs. intubation (1)
- Needle thoracostomy (1)
- PRBCs on helos (2)
- Battlefield antibiotics (1)

Tourniquets – Beekley et al Journal of Trauma 2008

- 31st CSH in 2004
- 165 casualties with severe extremity trauma
- 67 with pre-hospital tourniquets; 98 without
- Seven deaths
- Four of the seven deaths were potentially preventable had an adequate prehospital tourniquet been placed

Tactical Combat Casualty Care in Special Operations


Supplement to
MILITARY
MEDICINE
Volume 161, August 1996
Tactical Combat Casualty Care in Special Operations
Official Journal of the Association of Military Surgeons of the U.S.

Military Medicine
Supplement
August 1996

Trauma care guidelines customized for the battlefield

TCCC

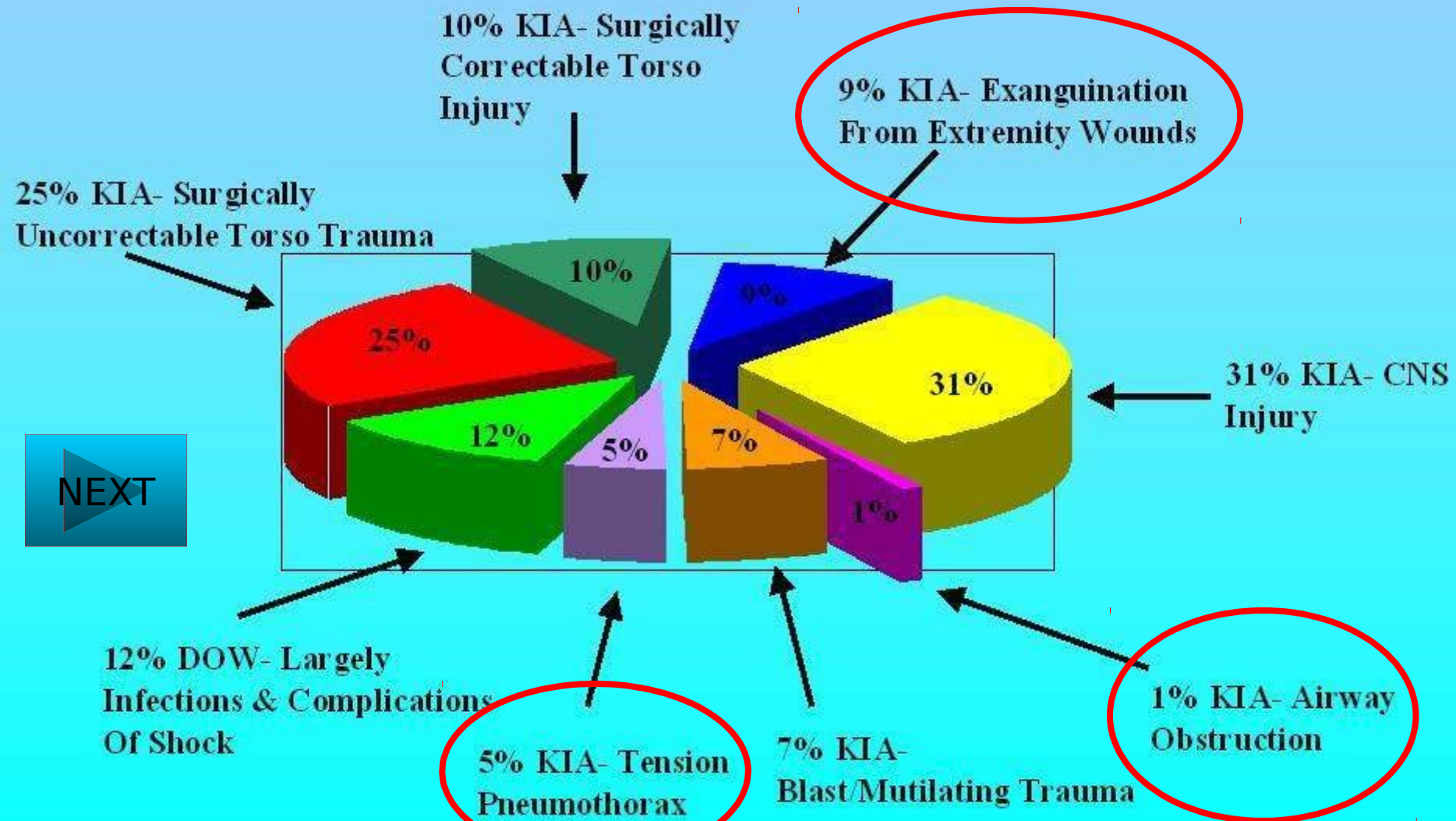
- Originally a Special Operations research effort
- Trauma management plans that take into account the unique challenges faced by combat medical personnel
- Now used throughout U.S. military and by most allied countries
- **TCCC has helped U.S. combat forces to achieve the highest casualty survival rate in history.**

TCCC Approach

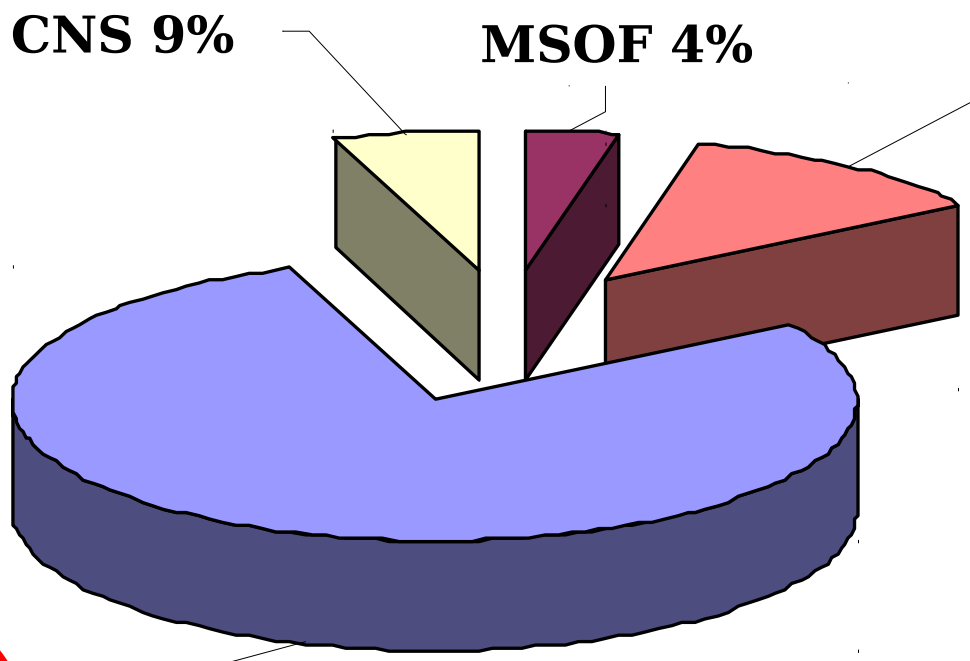
- Identify the causes of preventable death on the battlefield
- Address them aggressively
- Combine good medicine with good tactics

How People Die In Ground Combat (From COL Ron Bellamy)

Data based on the Wound Data Munitions Effectiveness Team (WDMET) during the Vietnam War between 1967 and 19



Potentially Preventable Deaths (232) in OIF and OEF



From evaluation of 982 casualties, and casualties could have more than 1 cause of death. (Kelly J., J Trauma

Preventable Death on the Battlefield: OEF and OIF

Eastridge 2012 Study:

- 4,596 U.S. deaths
- 87% pre-hospital deaths
- 24% of pre-hospital deaths were potentially survivable

Holcomb, et al, 2005 – US SOF Preventable Deaths = 15%
Kelly, et al, 2008 – US Military Preventable Deaths = 24%
Eastridge, et al, 2011, 2012 – US Military Preventable Deaths = 27.6%

Point of Wounding Care

- Causes of preventable death on the battlefield today:
  - Hemorrhage from extremity wounds
  - Junctional hemorrhage (where an arm or leg joins the torso, such as in the groin area after a high traumatic amputation)
  - Non-compressible hemorrhage (such as a gunshot wound to the abdomen)
  - Tension pneumothorax
  - Airway problems

Junctional Hemorrhage

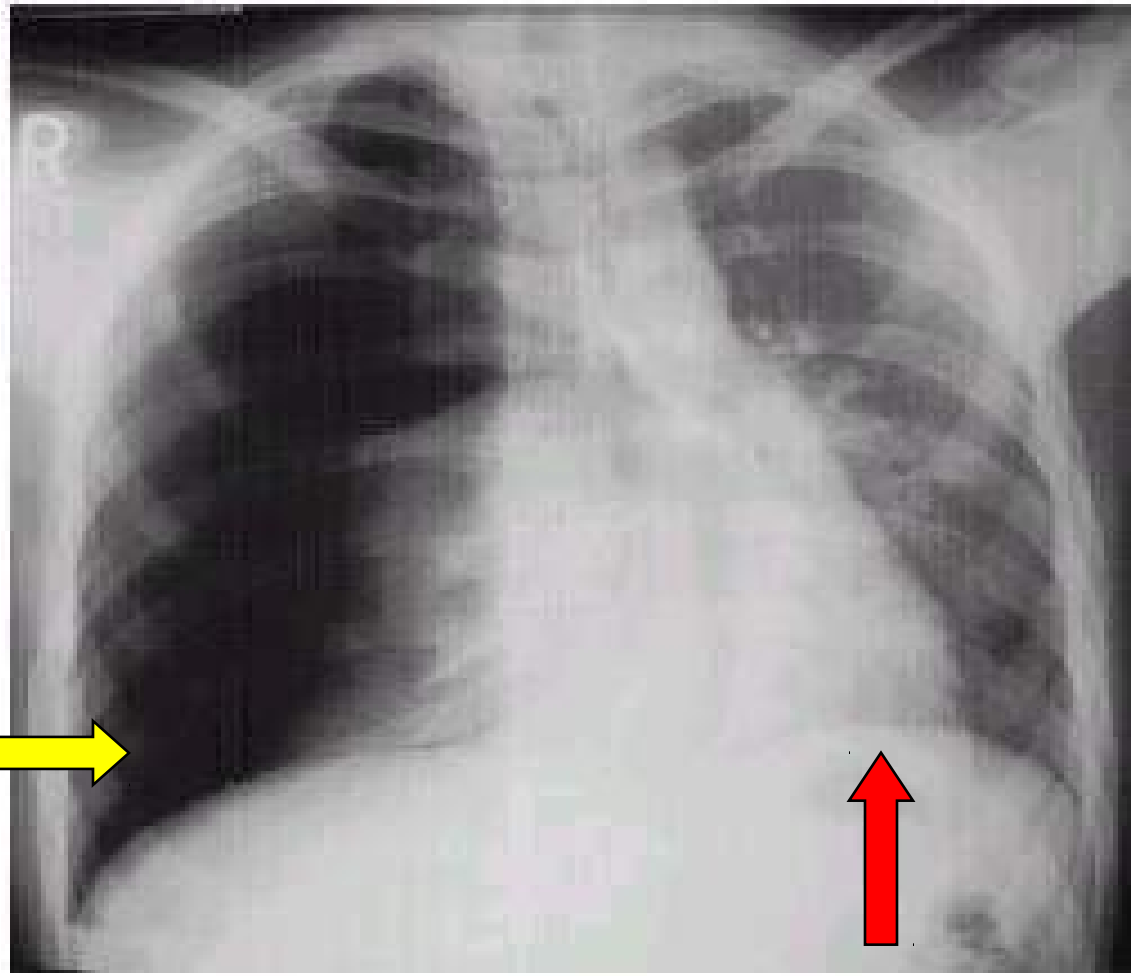
These types of wounds are often caused by IEDs and may result in

Extremity Hemorrhage

Tension Pneumothorax

Air escapes from injured lung – pressure builds up in chest

Air pressure collapses lung and pushes on heart



Heart compressed - not able to pump well

Airway Trauma

Three Objectives of TCCC

- Treat the casualty
- Prevent additional casualties
- Complete the mission

TCCC Guidelines 1996

- Tourniquets
- Aggressive needle thoracostomy
- Nasopharyngeal airways
- Surgical airways for maxillofacial trauma
- Tactically appropriate fluid resuscitation
- Battlefield antibiotics
- Improved battlefield analgesia
- Combine good tactics and good medicine
- Scenario-based training

Changes in TCCC: How Are They Made?

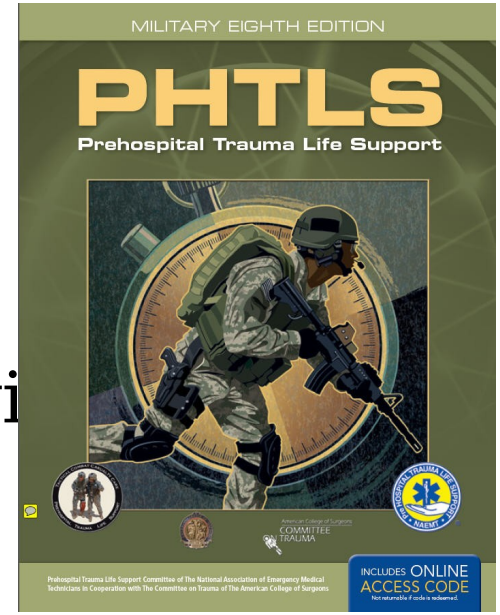
The Committee on Tactical Combat Casualty Care

Committee on Tactical Combat Casualty Care

- Sponsored by the DoD
- 42 members from all services in the DoD and civilian sector
- Trauma Surgeons, ER and Critical Care physicians, operational physicians; medical educators; combat medics, corpsmen, and PJs
- 100% deployed experience
- Meet quarterly; update TCCC as needed
- Part of Defense Health Board – senior medical advisory body to SECDEF

TCCC Today: Additional Interventions

- Hemostatic dressings
- Intraosseous infusion devices
- Hypotensive resuscitation
- Fentanyl lozenges for severe pain
- Ketamine as an analgesic option
- Junctional hemorrhage control devi
- Tranexamic Acid (TXA)
- Cric-Key for surgical airways
- Hypothermia prevention
- Management of wounded hostile combatants



TCCC: How Do We Know That it's Working?

TCCC Early in OIF/OEF Conflicts

- NOT widely used at the start of the war
- Increased use by both Special Operations and conventional units beginning in 2005

The Drivers:

- Early reports of success with TCCC, especially TQs
- Holcomb study: “Causes of SOF Deaths 2001-2004”
- USAISR tourniquet study by Walters et al (2005)
- USSOCOM TCCC message – March 2005
- USCENTCOM tourniquet and hemostatic agents (HemCon) message - 2005

Preventable Combat Deaths from NOT using Tourniquets

- Maughon – *Mil Med 1970*: Vietnam
  - 193 of 2,600
  - 7.4% of total combat fatalities
- Kelly – *J Trauma 2008*: OEF + OIF (2003/4 and 2006)
  - 77 of 982 (in both cohorts of fatalities)
  - 7.8% of total fatalities – no better then Vietnam
- Tourniquets became widely used in 2005-2006
- Eastridge – *J Trauma 2012*: OEF + OIF (to Jun 2011)
  - 119 of 4,596
  - 2.6% of total fatalities – a 67% decrease

Tourniquet Outcomes in TCCC Transition Initiative Report

- Sixty-seven successful tourniquet applications identified
- No avoidable loss of limbs due to tourniquet use identified

Butler, Greydanus, Holcomb

2006 USAISR Report

"TCCC: Combat Evaluation 2005"

TCCC: Success in Combat
3rd Infantry Division

"The adoption and implementation of the principles of TCCC by the medical platoon of TF 1-15 IN in OIF 1 resulted in overwhelming success. Over 25 days of continuous combat with 32 friendly casualties, many of them serious, we had 0 KIAs and 0 Died From Wounds, while simultaneously caring for a significant number of Iraqi civilian and military casualties."

CPT Michael Tarpey

Battalion Surgeon 1-15 IN

AMEDD Journal 2005

TCCC

"I am writing to offer my congratulations for the recent dramatic advances in prehospital trauma care delivered by the U.S. military. Multiple recent publications have shown that Tactical Combat Casualty Care is saving lives on the battlefield."

Dr. Jeff Salomone

American College of Surgeons Committee on Trauma

Chairman of Prehospital Trauma Subcommittee

Mabry and McManus
AMEDD Center and School

"The new concept of Tactical Combat Casualty Care has revolutionized the management of combat casualties in the prehospital tactical setting."

Critical Care Medicine

July 2008

USMC Casualty Scenario 2008

- CoTCCC gets input directly from combat medics, corpsmen, and USAF pararescuemen (PJs)
- 15 casualties - 4 tourniquets applied
- 3 lives saved - 4th casualty died from chest wound

Tourniquets – Kragh et al: Two Landmark Papers

- Published in 2008/2009
- Tourniquets are saving lives on the battlefield
- 31 lives saved in 6 months by tourniquets
- Author estimates 2000 lives saved with tourniquets
  in this conflict up to that date (2009)

What are the Soldiers saying?

A recent U.S. Army Training and Doctrine Command survey of Soldiers in combat units found that TCCC is the second most valued element of their training, exceeded only by training in the use of their individual weapon.

COL Karen

TRADOC Surgeon
CoTCCC Meeting

Eliminating Preventable Death on the Battlefield

- TCCC in the 75th Ranger Regiment
- All Rangers and docs are trained in TCCC
- Ranger preventable death incidence: 3%

TCCC in Canadian Forces
Savage et al: Can J Surg 2011

Conclusion

"For the first time in decades, the CF has been involved in a war in which its members have participated in sustained combat operations and have suffered increasingly severe injuries. Despite this, the CF experienced the highest casualty survival rate in history. Though this success is multifactorial, the determination and resolve of CF leadership to develop and deliver comprehensive, multileveled TCCC packages to soldiers and medics is a significant reason for that and has unquestionably saved the lives of Canadian, Coalition and Afghan Security Forces….."

Hartford Consensus
2 April 2013

- Working group organized by American College of Surgeons Board of Regents and FBI
- In response to Sandy Hook shootings
- Excerpt from findings:

Life threatening injuries in active shooter incidents such as those in Fort Hood, Tucson, and Aurora are similar to those encountered in combat settings. Military experience has shown that the number one cause of preventable death in victims of penetrating trauma is hemorrhage. Tactical Combat Casualty Care (TCCC) programs, when implemented with strong leadership support, have produced dramatic reductions in preventable death. Recognizing that active shooter incidents can occur in any community, the Hartford Consensus encourages the use of existing techniques and equipment, validated by over a decade of well-documented clinical evidence.

ASDHA TCCC Letter 14 February 2014

THE ASSISTANT SECRETARY OF DEFENSE

1200 DEFENSE PENTAGON
WASHINGTON, DC 20301-1200

HEALTH AFFAIRS

FEB 14 2014

MEMORANDUM FOR DIRECTOR, DEFENSE HEALTH BOARD

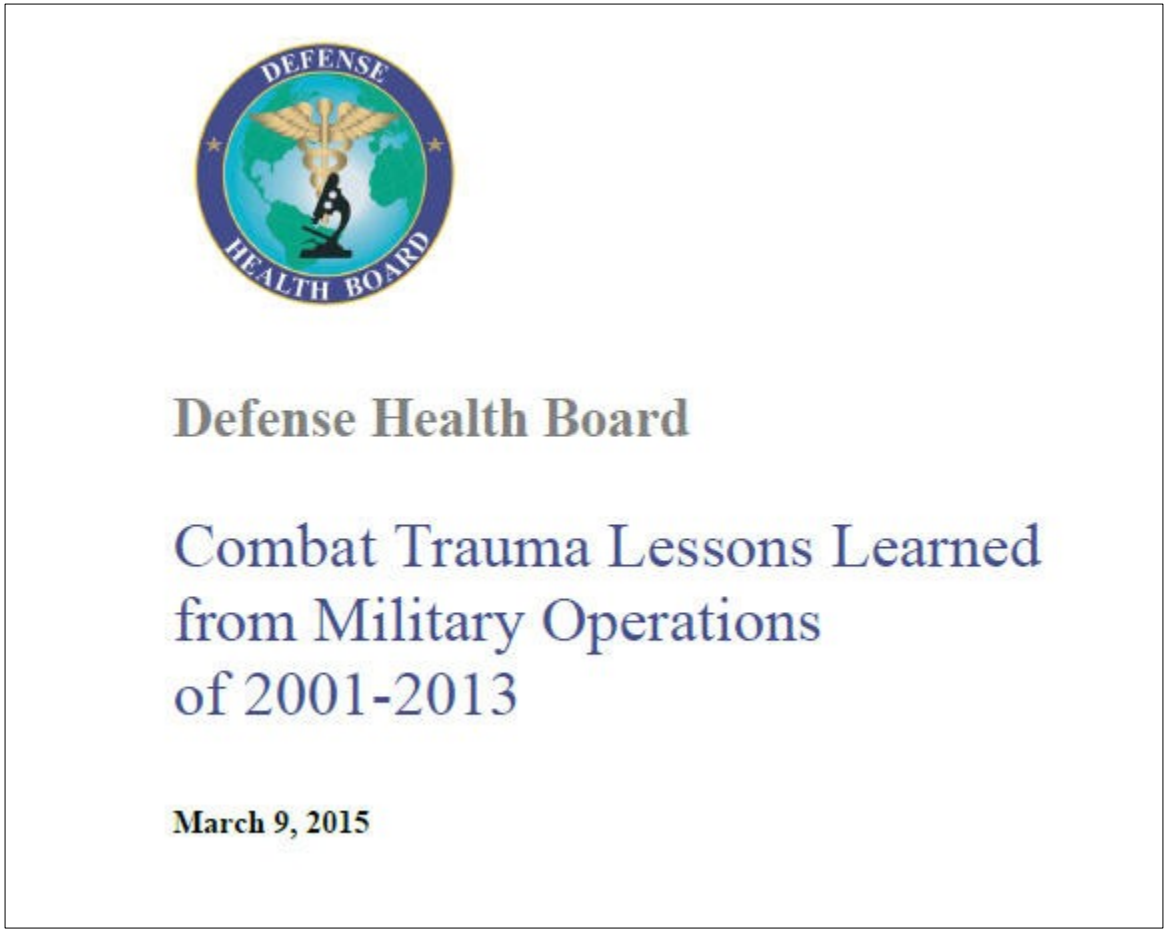
SUBJECT: Tactical Combat Casualty Care Training for Deploying Personnel, 2011-02

Please accept my appreciation for your continued efforts to provide the Department of Defense with constructive recommendations to help maximize the health, safety, and effectiveness of the U.S. Armed Forces. As we continue to seek opportunities to improve and standardize medical training, we have reviewed and will accept your recommendations related to "Tactical Combat Casualty Care (TCCC) Training for Deploying Personnel." We will incorporate training guidance as described in your recommendation to facilitate uniform TCCC training throughout the Department.

The point of contact for questions regarding this action is Ms. Elizabeth Fudge. Ms. Fudge may be reached at (703) 681-8295, or Elizabeth.Fudge@dha.mil.

Jonathan Woodson, M.D.

Defense Health Board
9 March 2015



Defense Health Board

Combat Trauma Lessons Learned
from Military Operations
of 2001-2013

March 9, 2015

Defense Health Board
9 March 2015

Lesson 9: *Effectively trained TCCC has a demonstrable*

effect on reducing potentially preventable causes of death

on the battlefield.

Recommendation 9: TCCC shall continue to form the

basis for battlefield trauma care and be integrated as the

minimal accepted standard of training for all military members,

initial enlisted medical training, and specialized

USFOR-A FRAGO 14-067
21 March 2014

- All physicians, physician assistants, nurse practitioners, medics, corpsmen, parajumpers (PJs) and nurses in CJOA-A (Afghanistan) will be trained in TCCC
- Training will be done in accordance with current TCCC Guidelines (found on Joint Trauma System website)
- Curriculum to support this training is found on the Military Health System website
- Training is reportable to the chain of command
- Units will field equipment to perform TCCC

In Phases of Care in TCCC: Timing Is Everything

- Casualty scenarios in combat usually entail both a medical problem as well as a tactical problem.
- We want the best possible outcome for both the casualty and the mission.
- Good medicine can sometimes be bad tactics; bad tactics can get everyone killed or cause the mission to fail.
- Doing the RIGHT THING at the RIGHT TIME is critical

TCCC Phases of Care

- TCCC divides care into 3 phases based on the tactical situation.
- During the gunfight, attention is focused primarily on eliminating the threat.
- As the threat decreases, increasing focus is applied to providing the best possible medical care for the casualties.

Phases of Care in TCCC

- Care Under Fire
- Tactical Field Care
- Tactical Evacuation C

Care Under Fire

- Care under fire is the care rendered by the first responder or combatant at the scene of the injury while they are still under effective hostile fire.

- Available medical equipment is limited to that carried by the individual or by the medical provider in his or her aid bag.

Tactical Field Care

- Tactical Field Care is the care rendered by the first responder or combatant once he and the casualty are **no longer under effective hostile fire**.

- It also applies to situations in which an injury has occurred, but there has been no hostile fire.

- Available medical equipment is still limited to that carried into the field by unit personnel.

- Time to evacuation to a medical treatment facility may vary considerably.

Tactical Evacuation Care

- Tactical Evacuation Care is the care rendered once the casualty has been picked up by an aircraft, ground vehicle or boat.

- Additional medical personnel and equipment that may have been pre-staged should be available in this phase of casualty management.

Summary of Key Points

- Pre-hospital trauma care in tactical settings is very different from civilian settings.
- Tactical and environmental factors have a profound impact on trauma care rendered on the battlefield.
- Good medicine can be bad tactics.
- Up to 24% of combat deaths today are potentially preventable.
- Good first responder care is critical.
- TCCC will give you the tools you need!

Summary of Key Points (cont.)

- Three phases of care in TCCC:
  - Care Under Fire
  - Tactical Field Care
  - TACEVAC Care

Summary of Key Points

- TCCC – designed for combat
- NOT designed for civilian trauma settings
- But may have applicability in some cases

Questions?